

First G-APD Cherenkov Telescope

for ground-based γ -ray Astronomy

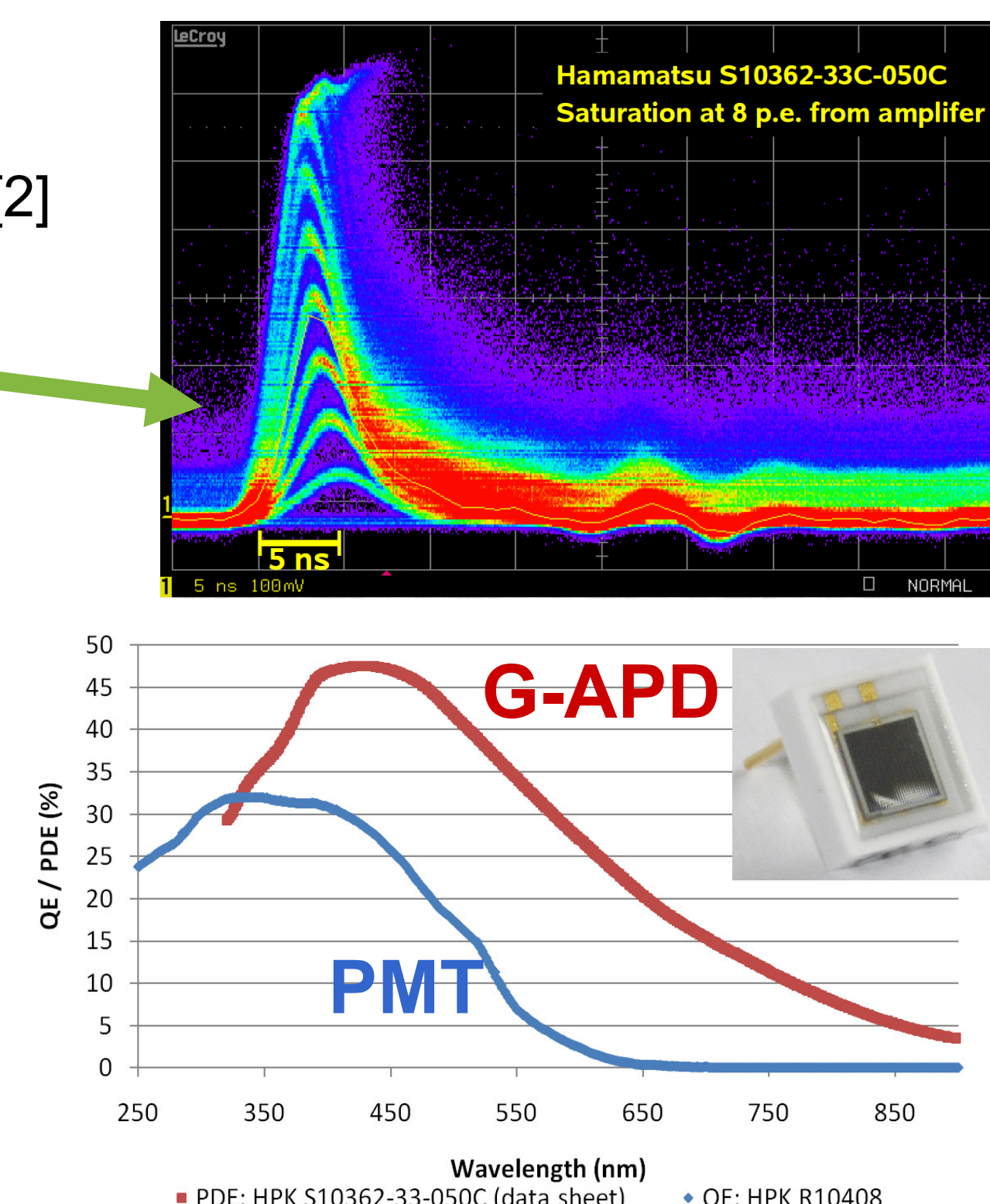
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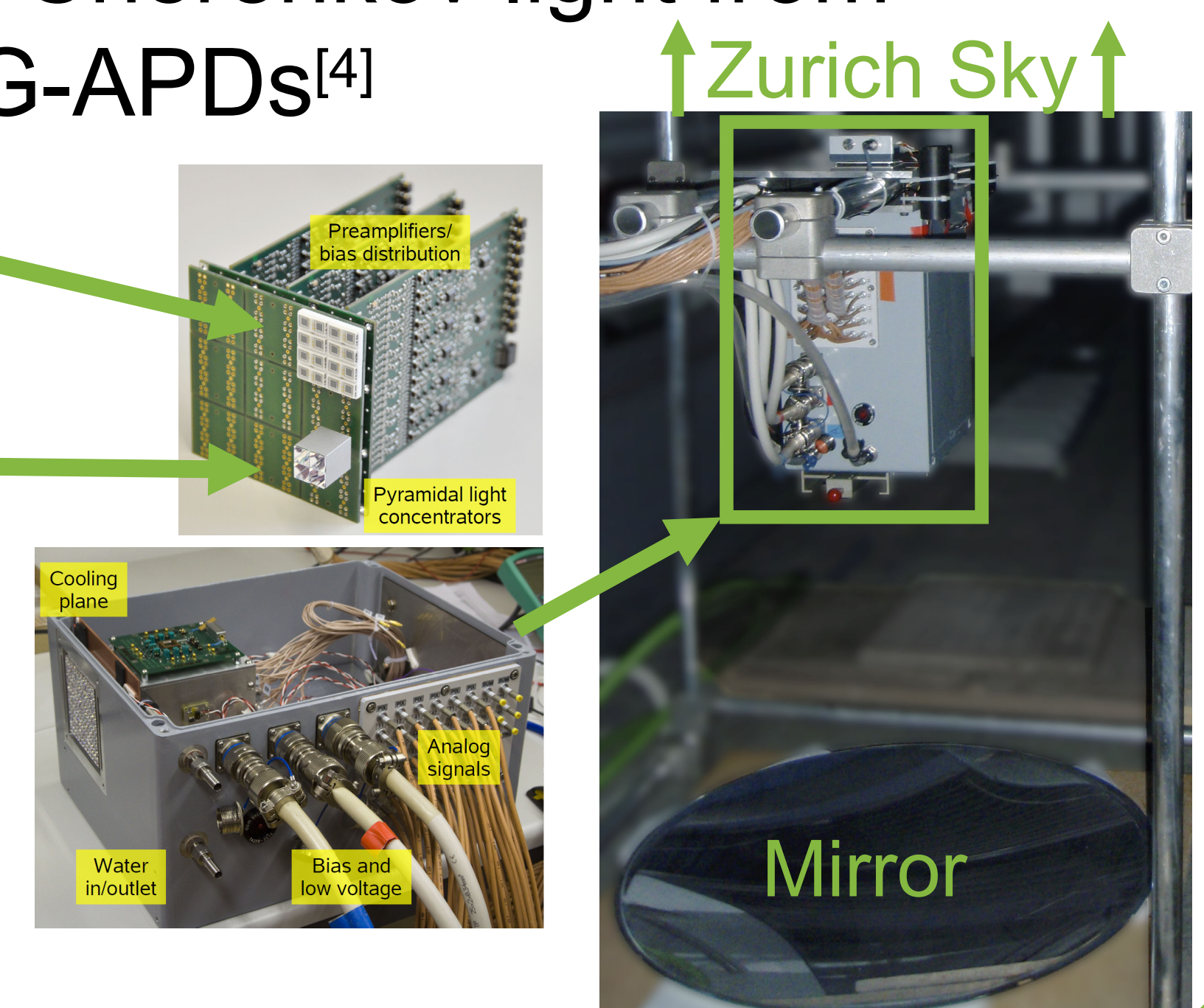
G-APDs^[1]

- Novel photosensors with potential to replace PMTs^[2]
- Single p.e. resolution
- High PDE
- Negligible time-jitter
- Not damaged by bright light
- Very compact & robust
- Not used in IACTs, **yet**



36-Pixel Testcamera M0^[3]

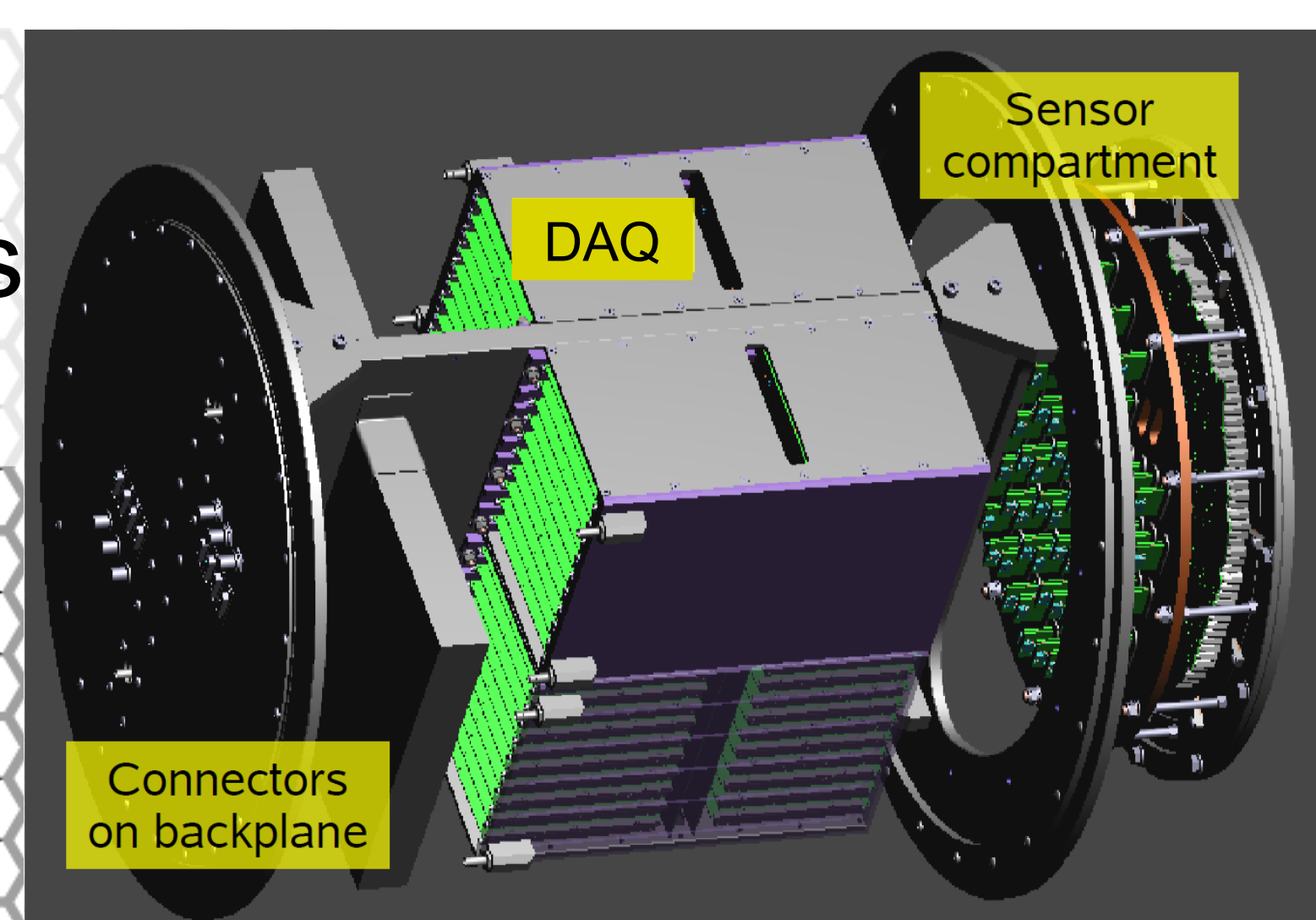
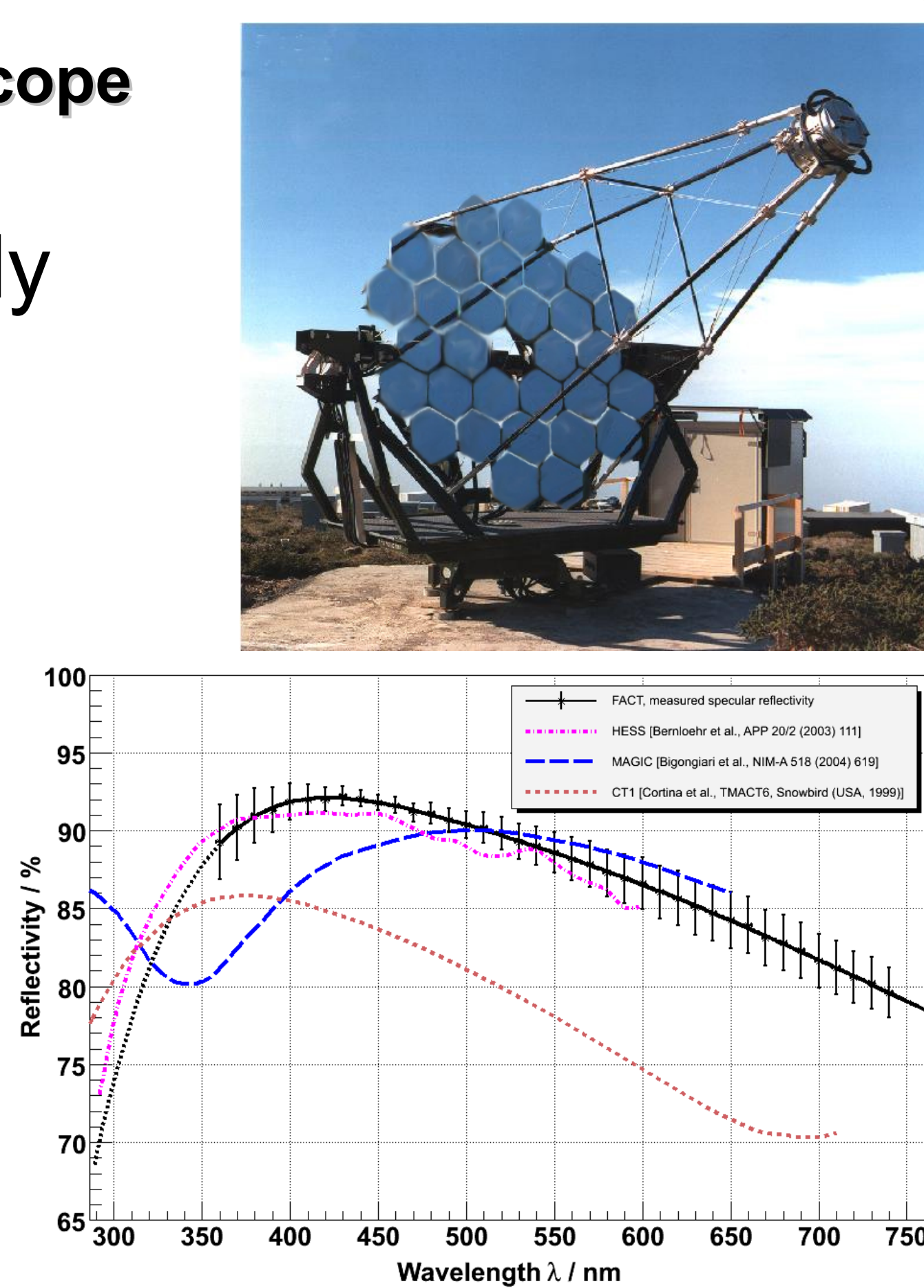
- First test to detect Cherenkov light from air showers with G-APDs^[4]
- 144 G-APDs
- 36 pixels
- Light-cones
- $\sim 1^\circ$ FoV/pixel
- DRS2 DAQ
- 1.2GHz NSB/pixel



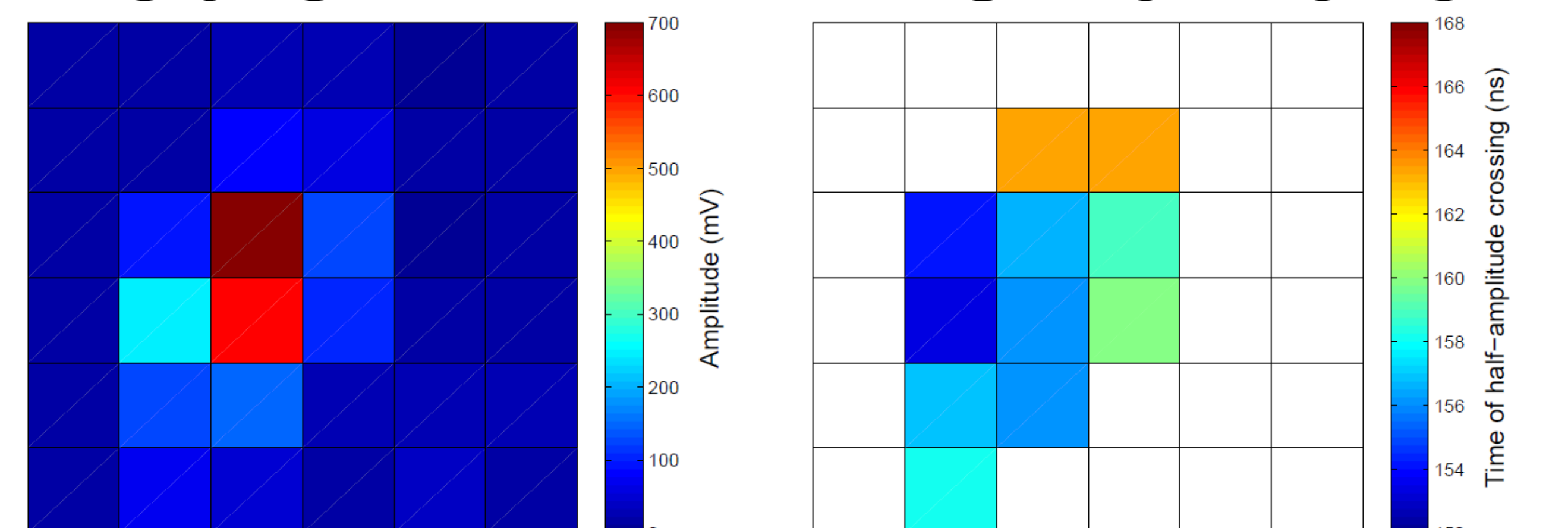
FACT^[6,7]

First G-APD Cherenkov Telescope

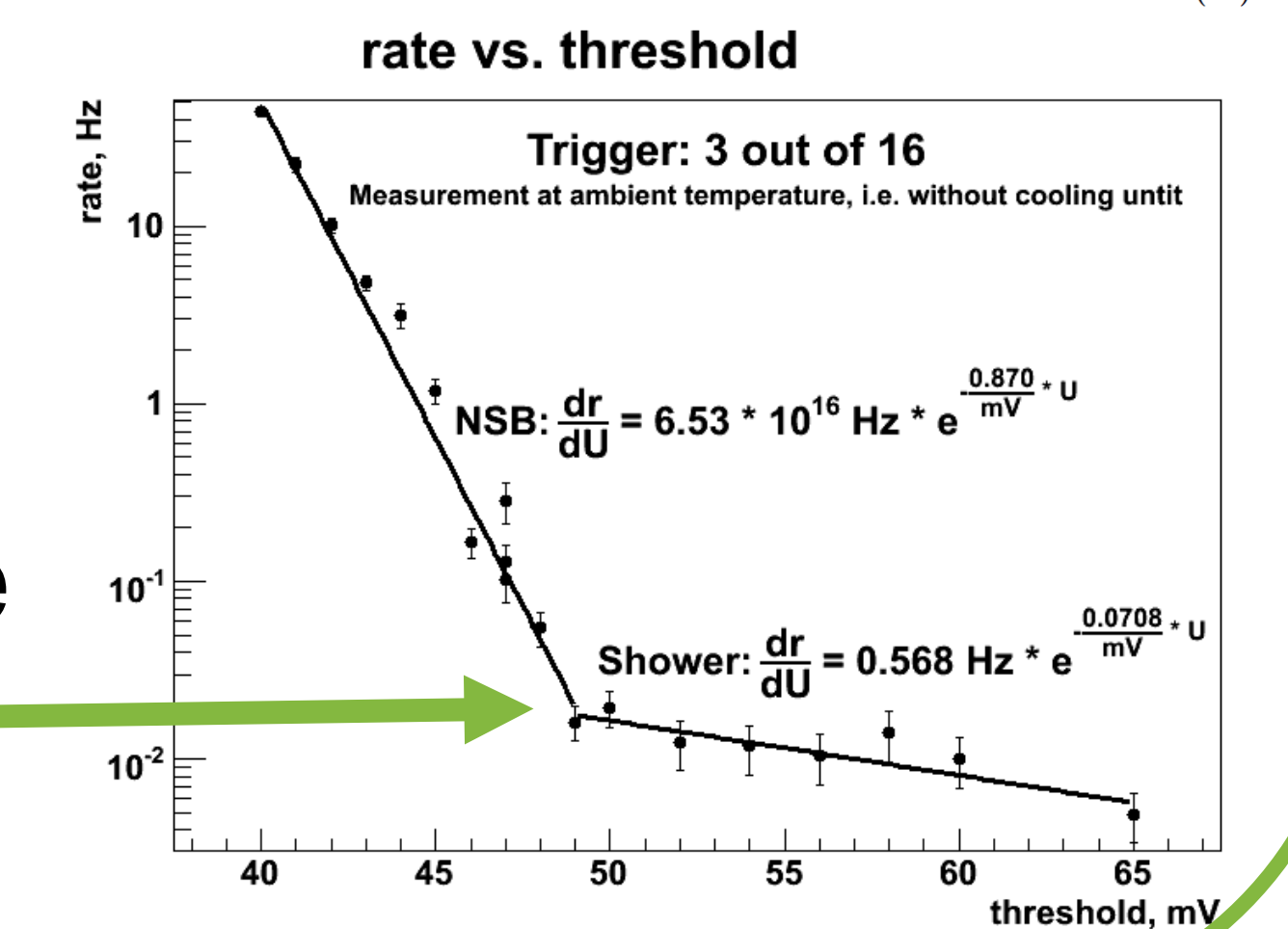
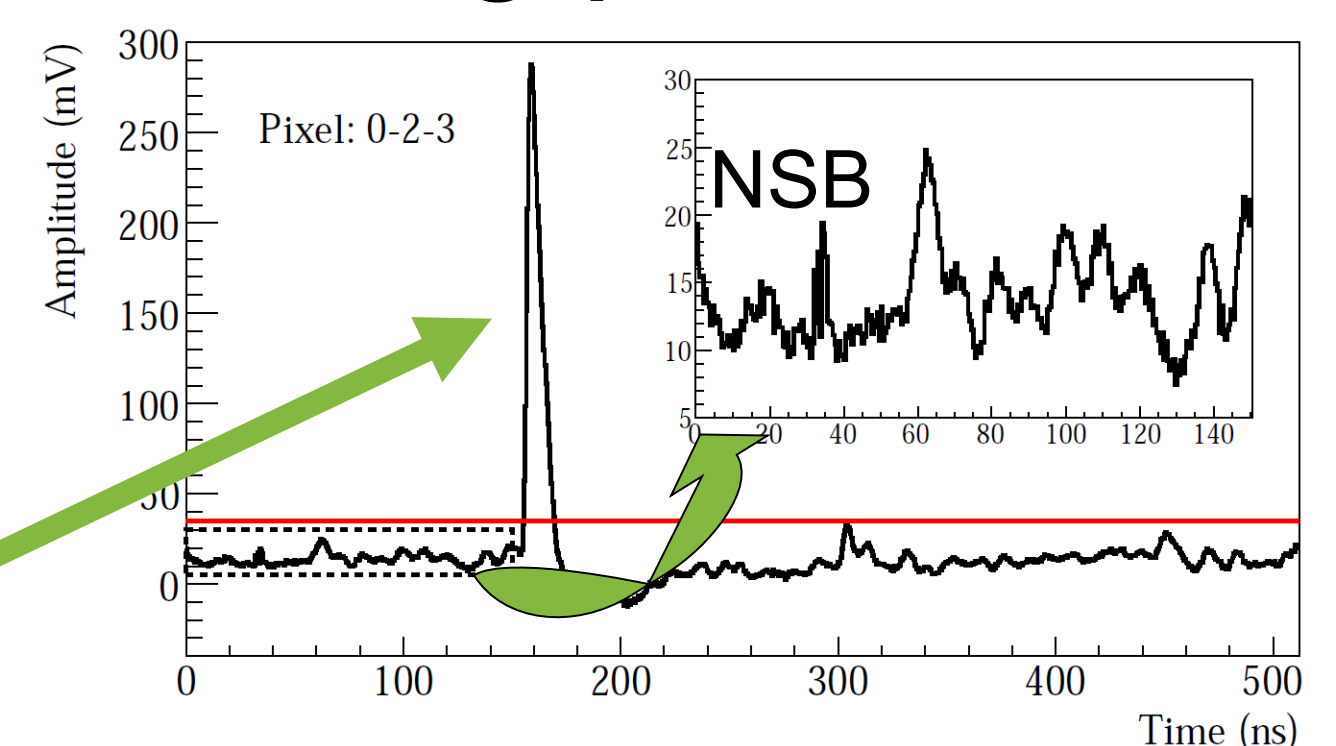
- Telescope Mount already on La Palma
- Microcontroller based Drive System
- 9,5m² Aluminum Mirrors
- G-APD Camera:
 - 1440 Pixel
 - Fully integrated DAQ
 - Based on DRS4
 - 2GHz sampling
 - Analog sum of groups of 9 pixels for trigger



First G-APD Air-Showers^[5]

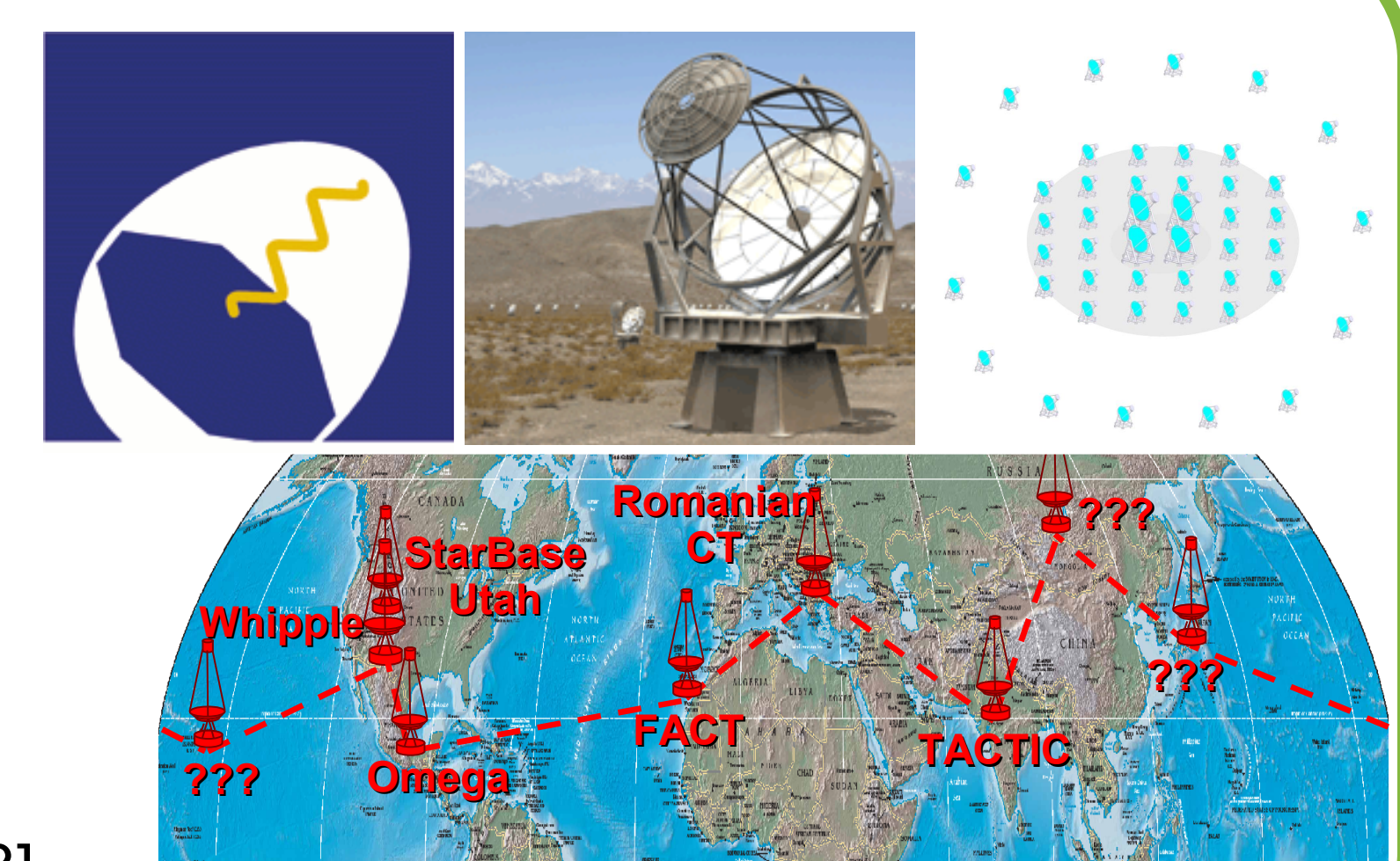


- Operated at ambient temperature
- Self-triggered
- Real shower pulse
- Clear transition from night sky background (NSB) to showers in the rate when increasing the trigger threshold



Future

- Possible use in
 - MAGIC upgrade
 - CTA upgrades
 - AGIS
 - DWARF-Network^[8]



Abbreviations DAQ (Data Acquisition System), DRS (Domino Ring Sampling chip), FoV (Field of View), G-APD (Geiger-mode Avalanche Photo Diode), NSB (Night Sky Background), PDE (Photon Detection Efficiency), PMT (Photo Multiplier Tube)

References [1] D. Renker⁺, JINST 4 P04004 [2] Krähenbühl⁺, ICRC'09 [3] I. Braun⁺, NIM-A, 610, 400 [4] Q. Weitzel⁺, ICRC'09 [5] H. Anderhub⁺, JINST 4 P10010 [6] T. Bretz⁺, AIP 1085, 850 [7] T. Bretz⁺, ICRC'09 [8] M. Backes⁺, ICRC'09

Goal:
Observing Crab nebula next season